

CLAIMS:

1. An apparatus for downhole production or injection wells, comprising:
- a) one or more downhole production or injection wells; and
 - b) a control system comprising:
 - i) one or more surface control and data acquisition systems;
 - ii) one or more sensors disposed in communication with the surface control and data acquisition systems;
 - iii) one or more downhole devices disposed in communication with the surface control and data acquisition systems; and
 - iv) one or more remote controllers disposed in communication with the surface control and data acquisition systems.
2. The apparatus of claim 1 wherein the downhole devices comprise one or more devices selected from the group of smart shunt screens, sliding sleeves, chemical injection devices, circulating valves, gas lift valves, water injection valves, smart screens chokes, diverters, flappers, safety valves, and packers.
3. The apparatus of claim 1 wherein the downhole devices are disposed in communication with one or more components of the one or more downhole production or injection wells.
4. The apparatus of claim 1 wherein the downhole devices are disposed in communication with one or more sensors of the control system.
5. The apparatus of claim 1 wherein the one or more sensors comprise one or more permanent downhole sensors.
6. The apparatus of claim 1 wherein the one or more sensors comprise one or more retrievable sensors.
7. The apparatus of claim 1 wherein the control system comprises an electric control

2 system.

1 8. The apparatus of claim 1 wherein the downhole production well comprises an
2 artificial lift system disposed in cooperation with the downhole well.

1 9. The apparatus of claim 8 wherein the artificial lift system includes a programmable
2 automation control system.

1 10. The apparatus of claim 8 wherein the artificial lift system includes one or more
2 surface sensors disposed to monitor operation of the artificial lift system.

1 11. The apparatus of claim 8 wherein the artificial lift system includes one or more
2 sub-surface sensors disposed to monitor operation of the artificial lift system.

1 12. The apparatus of claim 8 wherein the control system comprises an electric control
2 system.

1 13. The apparatus of claim 1, further comprising:

2 c) a retrievable pump system disposed in cooperation with the downhole
3 production or injection well.

1 14. The apparatus of claim 13 wherein the retrievable pump system comprises sensors.

1 15. The apparatus of claim 13 wherein the retrievable pump system is deployed by a
2 component selected from the group consisting of coil tubing, electric line, hydraulic
3 pumping, and wire line.

1 16. The apparatus of claim 15 wherein the retrievable pump system is connected to one
2 or more communication control member selected from the group of fiber optic lines, fluid
3 pumping lines, electric lines and wireless components.

1 17. The apparatus of claim 13 wherein the retrievable pump system comprises one or

2 more pumps selected from the group consisting of an electric submersible pump, a linear
3 motor drive pump, an impeller driven pump, a progressive cavity pump, a gas lift, a rod
4 pump and a jet pump.

1 18. The apparatus of claim 17 wherein the electric submersible pump is disposed in
2 electrical connection with one or more wet connects disposed inside a production tubing of
3 the downhole production well.

1 19. The apparatus of claim 17 wherein the electric submersible pump is disposed in
2 electrical connection with an inductive coupler connected to the control system.

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2 20. The apparatus of claim 1 wherein the control system further comprises:
v) a communication device disposed between the one or more remote
3 controllers and the one or more surface control and data acquisition systems.

1 21. The apparatus of claim 20 wherein the communication device comprises one or
2 more devices selected from the group of a telephone system, a satellite system, an internet
3 system, and a radio system.

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1 22. The apparatus of claim 21 wherein the remote controller comprises a computer
2 having an internet access and wherein the communication device comprises an internet
3 web site server.

1 23. The apparatus of claim 22 wherein the control system further comprises:
2 vi) a satellite system adapted to link signals between the internet web
3 site server and the surface control and data acquisition system.

1 24. An apparatus for downhole production or injection, comprising:
2 a) one or more completed electrically controlled wells;
3 b) one or more artificial lift systems incorporated in the one or more
4 completed wells; and
5 c) a control system comprising:

- 6 i) one or more surface control and data acquisition systems;
7 ii) one or more formation sensors disposed in communication with the
8 surface control and data acquisition systems;
9 iii) one or more devices of the artificial lift system disposed in
10 communication with the surface control and data acquisition systems; and
11 iv) one or more remote controllers disposed in communication with the
12 surface control and data acquisition system.

1 25. The apparatus of claim 24 wherein the one or more artificial lift systems comprises
2 one or more surface sensors and one or more sub-surface sensors.

1 26. The apparatus of claim 24 wherein the one or more artificial lift systems comprise
2 one or more programmable automation control systems.

1 27. The apparatus of claim 24, further comprising:

2 c) a retrievable pump system disposed in cooperation with the electrically
3 controlled well.

1 28. The apparatus of claim 27 wherein the retrievable pump system is deployed by a
2 component selected from the group consisting of coil tubing, electric wire line, hydraulic
3 pumping, and wire line.

1 29. The apparatus of claim 28 wherein the retrievable pump system is connected to one
2 or more control lines selected from the group consisting of fiber optic lines, fluid pumping
3 lines, and electric lines.

1 30. The apparatus of claim 27 wherein the retrievable pump system comprises one or
2 more pumps selected from the group consisting of an electric submersible pump, a linear
3 motor drive pump, an impeller driven pump, a progressive cavity pump, a gas lift, a rod
4 pump and a jet pump.

1 31. The apparatus of claim 30 wherein the retrievable pump system is disposed in

- 2 electrical connection with one or more wet connects disposed inside a production tubing of
3 the downhole production well.

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32. The apparatus of claim 24, further comprising:

- 3 d) a communication device disposed between the one or more remote
4 controllers and the one or more surface control and data acquisition systems, wherein the
5 communication device comprises one or more devices selected from the group of a
telephone system, a satellite system, an internet system, and a radio system.

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33. The apparatus of claim 32 wherein the remote controller comprises a computer
2 having an internet access and wherein the communication device comprises an internet
3 web site server.

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34. The apparatus of claim 33 further comprising:

- 2 e) a satellite system adapted to link signals between the internet web site
3 server and the one or more surface control and data acquisition systems.

35. An apparatus for controlling and monitoring one or more production or injection
2 wells, comprising:

- 3 a) one or more surface control and data acquisition systems;
4 b) one or more sensors disposed in communication with the one or more
5 control and data acquisition systems;
6 c) one or more downhole devices disposed in communication with the one or
7 more control and data acquisition systems; and
8 d) one or more remote controllers disposed in communication with the one or
9 more surface control and data acquisition systems.

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36. The apparatus of claim 35 further comprising:

- 2 e) a communication device disposed between the one or more remote
3 controllers and the one or more surface control and data acquisition systems.

37. The apparatus of claim 35 wherein the communication device comprises one or

21 2 more devices selected from the group of a telephone system, a satellite system, an internet
3 system, and a radio system.

22 1 38. The apparatus of claim 37 wherein the remote controller comprises a computer
2 having an internet access and wherein the communication device comprises an internet
3 web site server.

23 1 39. The apparatus of claim 38 further comprising:
2 f) a satellite system adapted to link signals between the internet web site
3 server and the one or more surface control and data acquisition systems.

1 40. The apparatus of claim 35 wherein the sensors comprise one or more permanent
2 downhole sensors.

1 41. The apparatus of claim 35 wherein the sensors comprise one or more retrievable
2 downhole sensors.

Sub 1 42. A method for monitoring and controlling a production or injection well or oilfield,
2 comprising:

3 a) transmitting data collected by a downhole sensor module to a control and
4 data acquisition system;

5 b) evaluating downhole operating conditions and optimizing downhole
6 operating parameters utilizing an optimization software program disposed in
7 communication with the control and data acquisition system; and

8 c) transmitting signals between the control and data acquisition system and a
9 remote controller utilizing a communication system, the remote controller comprising a
10 computer having an internet access.

43. The method of claim 42, further comprising:

1 d) storing data collected by the downhole sensor module in a memory storage
2 in the control and data acquisition system.

44. The method of claim 42, further comprising:

d) collecting operational data utilizing one or more surface sensors connected to the control and data acquisition system.

45. The method of claim 42 wherein the control and data acquisition system utilizes a satellite link to transfer data via satellite to the remote controller.

46. The method of claim 42 wherein the remote controller sends commands to the control and data acquisition system to modify operation of a downhole pump or to change parameters inside the control and data acquisition system.

47. The method of claim 42 wherein the control and data acquisition system provides on-site access to data and control of operation parameters.

48. The method of claim 42 wherein one or more control modules are disposed inside the wellbore to control the flow of fluids in the wellbore to optimize downhole component efficiency.

49. The method of claim 42 wherein the downhole sensors are connected to the control and data acquisition system through a hydraulic line or an electric line deployed from the surface into the wellbore.

50. The method of claim 42 wherein the remote controller is adapted to send a command to the downhole sensor module via satellite communications.

51. The method of claim 42 wherein the downhole sensor module is connected to the control and data acquisition system utilizing digital or analog communication techniques.

52. The method of claim 42 wherein the downhole sensor module is connected to the control and data acquisition system utilizing one or more communication members selected from the group of electrical cables, fiber optic cables, hydraulic devices, electromagnetic devices, earth conduction devices, and acoustic devices.

- 1 53. The method of claim 42 wherein the control and data acquisition system is adapted
2 to control amount of chemicals delivered inside the wellbore.
- 1 54. The method of claim 42 wherein the control and data acquisition system is adapted
2 to monitor and control steam injection into the wellbore.
- 1 55. The method of claim 42 wherein the control and data acquisition system is adapted
2 to monitor and control formation influx.
- 1 56. The method of claim 42 wherein the control and data acquisition system is adapted
2 to monitor and control water influx.

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